

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname _____

Forename(s) _____

Candidate signature _____



GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

Monday 11 November 2019 Afternoon Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
TOTAL	

Advice

In all calculations, show clearly how you work out your answer.



Answer all questions in the spaces provided

Do not write
outside the
box

- 1 On a circle, which of these is **not** a straight line?
Circle your answer.

[1 mark]

circumference

radius

chord

diameter

- 2 Circle the expression that can be written as $3cd$

[1 mark]

$3 + c + d$

$c + c + c + d$

$c \times c \times c \times d$

$3 \times c \times d$

- 3 Which two numbers, when added together, make a cube number?
Circle your answer.

[1 mark]

1 and 8

2 and 4

9 and 18

8 and 64

9

6

27

72



4 Convert $2\frac{1}{2}$ kilograms into grams.

Circle your answer.

[1 mark]

25 grams

250 grams

2500 grams

25 000 grams

5 (a) Convert $\frac{47}{8}$ to a mixed number.

[1 mark]

Answer $5\frac{7}{8}$

5 (b) Convert $\frac{61}{128}$ to a decimal.

Give your answer to 2 decimal places.

[2 marks]

Answer 0.48



- 6 George buys some food for £16.55
He pays the exact amount with two notes and four coins.
List the notes and coins. [2 marks]

Notes £10 £5

Coins 50p 50p 50p 5p

- 7 Choose one of the following to make a correct statement each time. [4 marks]

	is less than	is equal to	is greater than
When $a = 3$	12 $4a$	<u>is greater than</u>	10 $a+7$
When $b = 8$	10 $2b-6$	<u>is equal to</u>	10 $18-b$
When $c = 0.5$	1.5 $3c$	<u>is equal to</u>	1.5 $c+1$
When $d = -1$	-1 d	<u>is less than</u>	1 d^2



- 6 Write down all the whole numbers that
are between 20 and 50
and
have a difference of 4 between their digits.

$$\begin{array}{c} \text{+4} \\ \curvearrowright \\ 2 \quad 6 \end{array}$$

$$\begin{array}{c} \text{+4} \\ \curvearrowright \\ 3 \quad 7 \end{array}$$

$$\begin{array}{c} \text{+4} \\ \curvearrowright \\ 4 \quad 8 \end{array}$$

$$\begin{array}{c} \text{-4} \\ \curvearrowleft \\ 4 \quad 0 \end{array} \quad [2 \text{ marks}]$$

Answer 26, 37, 40, 48

- 9 (a) Rearrange $m = p + 2$ to make p the subject.

[1 mark]

$$p = m - 2$$

Answer $p = m - 2$

- 9 (b) Simplify $5x^2 - x^2$

[1 mark]

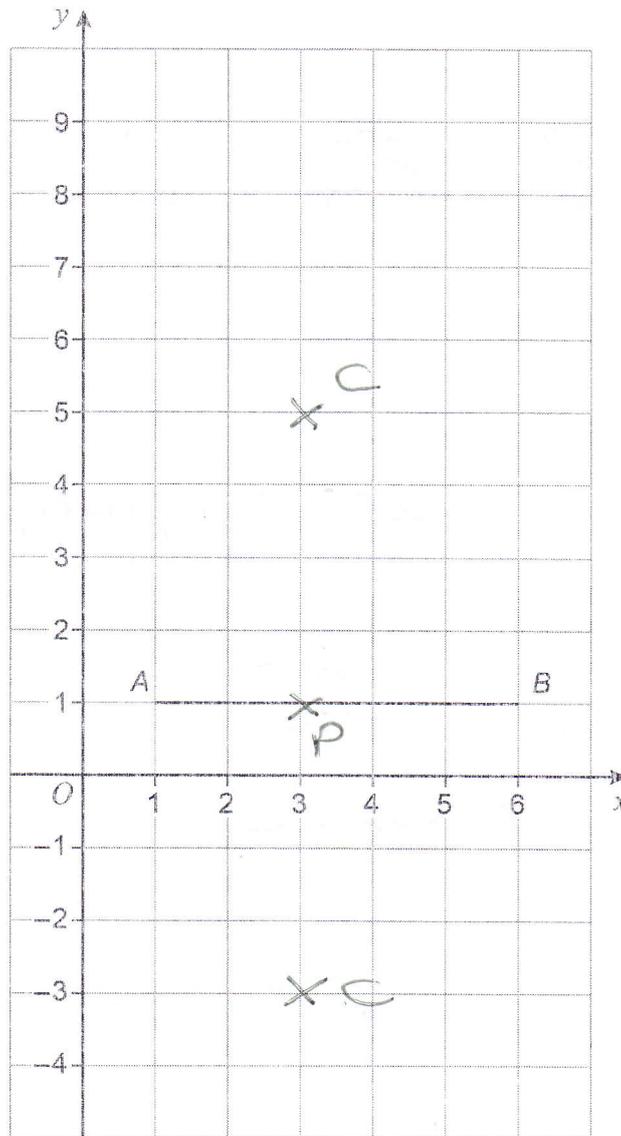
Answer $4x^2$



10

A line joins $A(1, 1)$ and $B(6, 1)$ on a centimetre grid.

Do not write
outside the
box



P is a point on the line AB such that

$$AP : PB = \underline{2 : 3}$$

C is a point such that

$$\text{angle } APC \text{ is } \underline{90^\circ}$$

and

$$PC = \underline{4 \text{ cm}}$$

Write down the coordinates of the **two** possible points for C .

[3 marks]

Answer (3 , 5) and (3 , -3)



- 11 At a school there are six lessons in a day.
In total, the six lessons last for five hours.

- 11 (a) Assume that each lesson lasts the same amount of time.

How many minutes long is the final lesson?

[2 marks]

$$5 \times 60 = 300 \text{ minutes}$$

$$300 \div 6 = 50 \text{ minutes}$$

Answer 50 minutes

- 11 (b) In fact, the first lesson of the day lasts longer than the other lessons.
The other lessons last the same amount of time.

What does this tell you about the length of the final lesson?

Tick one box.

[1 mark]

It is shorter than the answer to part (a)

It is the same as the answer to part (a)

It is longer than the answer to part (a)



- 12 A bottle contains 1.5 litres of water.
650 millilitres of the water is poured into a jug.
 How much water is left in the bottle?
 State the units of your answer.

[3 marks]

$$1500 - 650 = 850 \text{ ml}$$

Answer 850 ml

- 13 The cost of 5 kg of potatoes is £3.20
 The cost of $\frac{1}{2}$ kg of carrots is 29p
 Work out the **total** cost of 12 kg of potatoes and $1\frac{1}{2}$ kg of carrots.

[3 marks]

$$5 \text{ kg potatoes is } \pounds 3.20$$

$$1 \text{ kg} = 3.20 \div 5 = \pounds 0.64$$

$$12 \text{ kg} = 12 \times 0.64 = \pounds 7.68$$

$$\frac{1}{2} \text{ kg carrots} = 29\text{p}$$

$$1\frac{1}{2} \text{ kg carrots} = 29 \times 3 = \pounds 0.87$$

$$\pounds 7.68 + \pounds 0.87 = \pounds 8.55$$

Answer £ 8.55



- 14 (a) The term-to-term rule for a sequence is

add 4 then divide by 2

The 1st term of the sequence is 36

Work out the 3rd term.

[2 marks]

$$(36 + 4) \div 2 = 20$$

$$(20 + 4) \div 2 = 12$$

Answer 12

- 14 (b) The term-to-term rule for a different sequence is

divide by 3 then add 10

The 2nd term of this sequence is 60

Work out the 1st term.

[2 marks]

1st 60

↘ $\div 3$ ↗ $+10$

Inverse $60 - 10 = 50$

$$50 \times 3 = 150$$

Answer 150

15

The table shows the cost of hiring a concrete mixer for up to 5 days.

Number of days	1	2	3	4	5
Cost	£14	£24	£34	£44	£54

Eva hires the concrete mixer for 5 days.

She says,

"The rate is £14 per day because the cost for 1 day is £14"

Is she correct?

Give a reason for your answer.

[2 marks]

$$54 \div 5 = \pounds 10.80$$

No, it is ~~£~~10.80 per day

16

x is a negative number.

Which statement is correct?

Tick **one** box.

[1 mark]

$x + 10$ is always positive

$x + 10$ is always negative

$x + 10$ cannot be zero

$x + 10$ could be positive or negative or zero



- 17 The table shows the number of films watched one week by 30 people.

Number of films	Frequency	$f \times x$
0	5	0
1	9	9
2	8	16
3	6	18
4	2	8

Total = 30

51

- 17 (a) Write down the modal number of films watched.

[1 mark]

Answer 1

- 17 (b) Work out the mean number of films watched per person.

[3 marks]

$$\text{mean} = \frac{51}{30} = 1.7$$

Answer 1.7

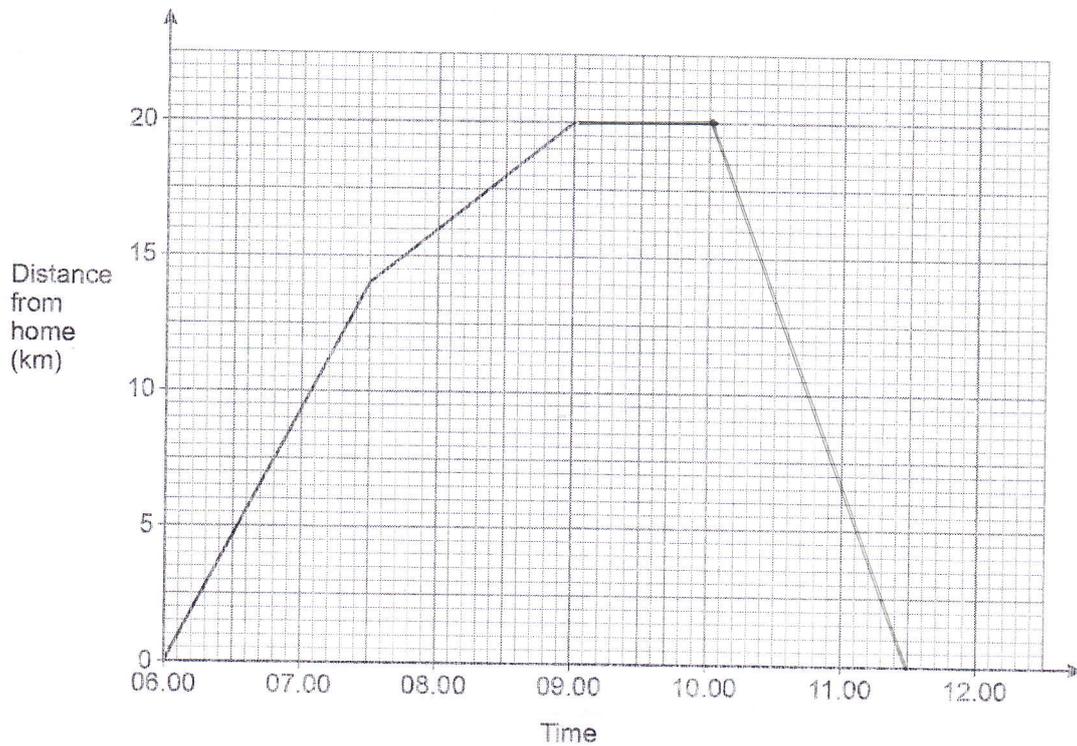


18

Jenny leaves home at 06.00

She runs for 3 hours.

Here is a distance-time graph of her run.



18 (a) How far from home is she after 3 hours?

[1 mark]

Answer 20 km

18 (b) For the next hour she rests.

She then gets a bus home.

She arrives home at 11.30

Complete the distance-time graph.

Assume the bus travels at a constant speed.

[2 marks]

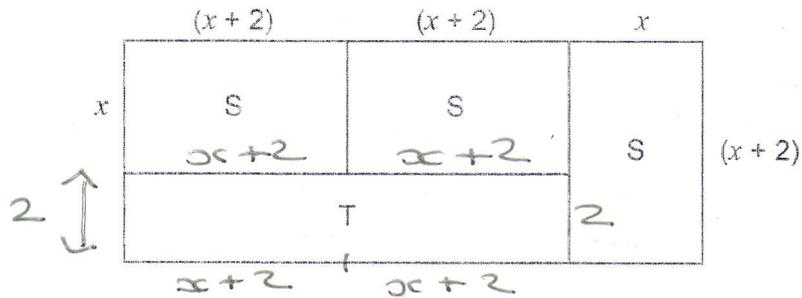


19

S and T are rectangles.

S has dimensions $(x+2)$ and x .

Some of these rectangles make the larger rectangle shown.

Not drawn
accurately

Work out an expression for the perimeter of T.

Give your answer in its simplest form.

[3 marks]

Perimeter of T

$$(x+2) + (x+2) + 2 + (x+2) + (x+2) + 2$$

$$= 4x + 12$$

Answer 4x + 12

20

 $a : b = 7 : 1$

Circle the correct equation.

[1 mark]

$a = 7b$

$b = 7a$

$a = 6b$

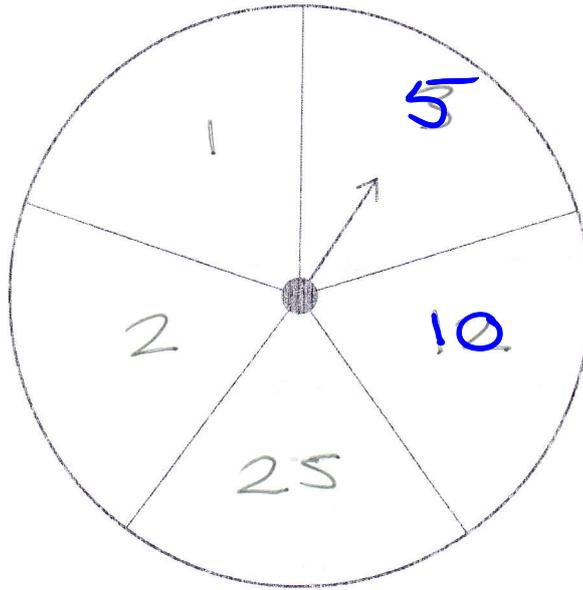
$b = 6a$

Turn over ►



21

A spinner has five equal sections.



Write a number in each section so that

the numbers are all different factors of 100

$P(\text{single-digit number}) = \frac{3}{5}$ 1, 2, 5

$P(\text{multiple of 25}) = \frac{1}{5}$ 25

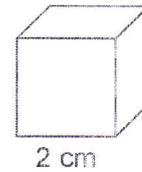
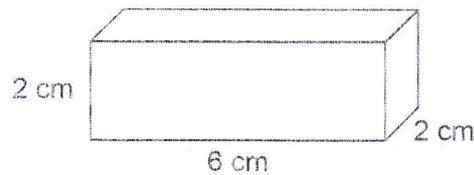
1 × 100
2 × 50
4 × 25
10 × 10

[3 marks]



22

Here is a small cuboid and a cube.



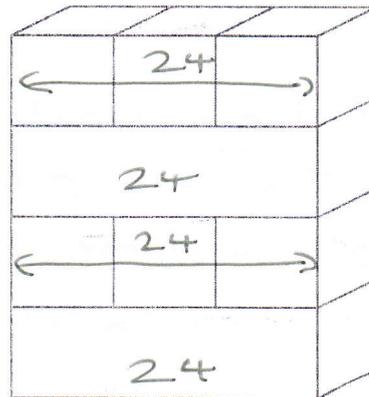
$$\text{Volume} = 2 \times 2 \times 6 = 24 \text{ cm}^3$$

3
Do not write
outside the
box

$$\begin{aligned} \text{Volume} &= 2 \times 2 \times 2 \\ &= 8 \text{ cm}^3 \end{aligned}$$

Small cuboids and cubes are stacked in layers to make larger cuboids.

Here is a cuboid made with four layers.



$$4 \times 24 = 96 \text{ cm}^3$$

This has
6 cubes

The pattern is continued to make a cuboid with volume 336 cm^3

How many cubes are used?

[3 marks]

$$336 \div 96 = 3.5$$

Number of cubes needed

$$= 3 \times 6 + 3$$

$$= 18 + 3 = 21$$

Answer 21

Turn over ►



23 (a) Tom is tiling a wall.

He needs to buy at least 100 tiles.

The tiles are sold in large packs and small packs.

Large pack 40 tiles £18

Small pack 28 tiles £14

Special offer

25% reduction when you buy 3 or more large packs

Work out the cheapest cost for Tom to buy the packs of tiles he needs.

[3 marks]

Buy 3 large packs

$$3 \times 18 = 54$$

$$100\% - 25\% = 75\% = 0.75$$

$$0.75 \times 54 = 40.5$$

Answer £ 40.50



23 (b) Tom is also tiling a floor.

The floor is a rectangle with length 600 cm and width 240 cm

Each tile is a square with side 40 cm

Tom uses this method to work out the number of tiles he needs.

$$\begin{aligned} \text{Number of tiles that will fit along the length} &= 600 \div 40 \\ &= 15 \end{aligned}$$

$$\begin{aligned} \text{Number of tiles that will fit along the width} &= 240 \div 40 \\ &= 6 \end{aligned}$$

$$\begin{aligned} \text{Total number of tiles needed} &= 15 + 6 \\ &= 21 \end{aligned}$$

Give a reason why Tom's method is wrong.

[1 mark]

Should be $15 \times 6 = 90$ tiles

Turn over for the next question

Turn over ►



24

An equilateral triangle has side length 16 metres.

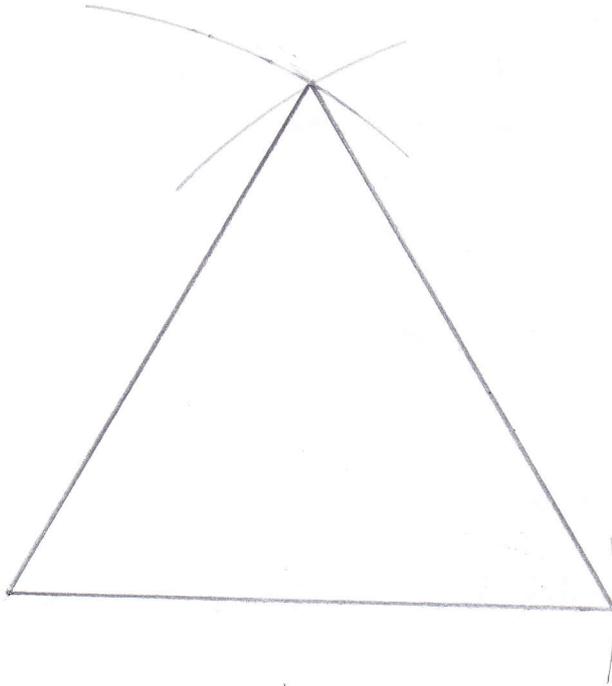
← 8 cm

Using ruler and compasses only, construct a scale drawing of the triangle.

Use the scale 1 centimetre represents 2 metres.

[3 marks]

Scale: 1 cm represents 2 m



Do not write
outside the
box



25 In a choir there are 35 men and 48 women.

The probability that a man chosen at random wears glasses is $\frac{2}{5}$

The probability that a woman chosen at random wears glasses is $\frac{3}{8}$

25 (a) Work out the number of people in the choir who wear glasses.

[3 marks]

$$\frac{2}{5} \times 35 = 14$$

$$\frac{3}{8} \times 48 = 18$$

$$\underline{32}$$

Answer 32

25 (b) A person is chosen at random from the choir.

Work out the probability that the person does not wear glasses.

[2 marks]

$$35 + 48 = 83$$

$$83 - 32 = 51$$

Answer $\frac{51}{83}$



26

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$\text{let } m=1 \quad \therefore d=1 \\ v=1$$

The mass is divided by 2 and the volume is multiplied by 4

What happens to the density?

Circle your answer.

$$D = \frac{\frac{1}{2}}{4} = \frac{1}{8}$$

[1 mark]

× 2

÷ 2

× 8

÷ 8

27

Solve the simultaneous equations

$$7x + 2y = 36 \quad (1)$$

$$3x + 2y = 16 \quad (2)$$

[3 marks]

$$(1) - (2) \quad 4x = 20$$

$$x = 5$$

put $x = 5$ in (1)

$$35 + 2y = 36$$

$$2y = 1$$

$$y = \frac{1}{2}$$

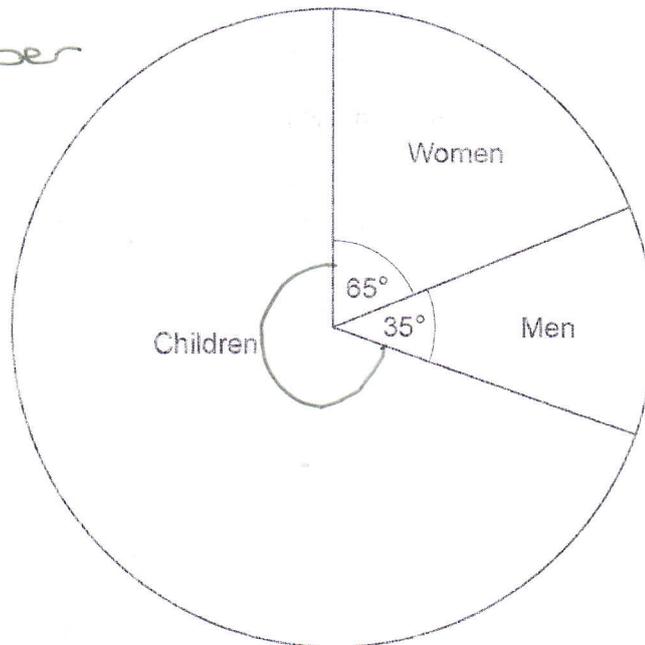
$$x = \underline{5} \quad y = \underline{\frac{1}{2}}$$



28

The pie chart shows information about people at a theme park.

Let number
of people
= x



There were 450 more women than men.

Work out the number of children.

[3 marks]

$$\frac{65}{360} \times x - \frac{35}{360} \times x = 450$$

$$\frac{30}{360} x = 450$$

$$x = \frac{450 \times 360}{30} = 5400$$

$$360 - 65 - 35 = 260$$

$$\text{Children} = \frac{260}{360} \times 5400 = 3900$$

Answer 3900

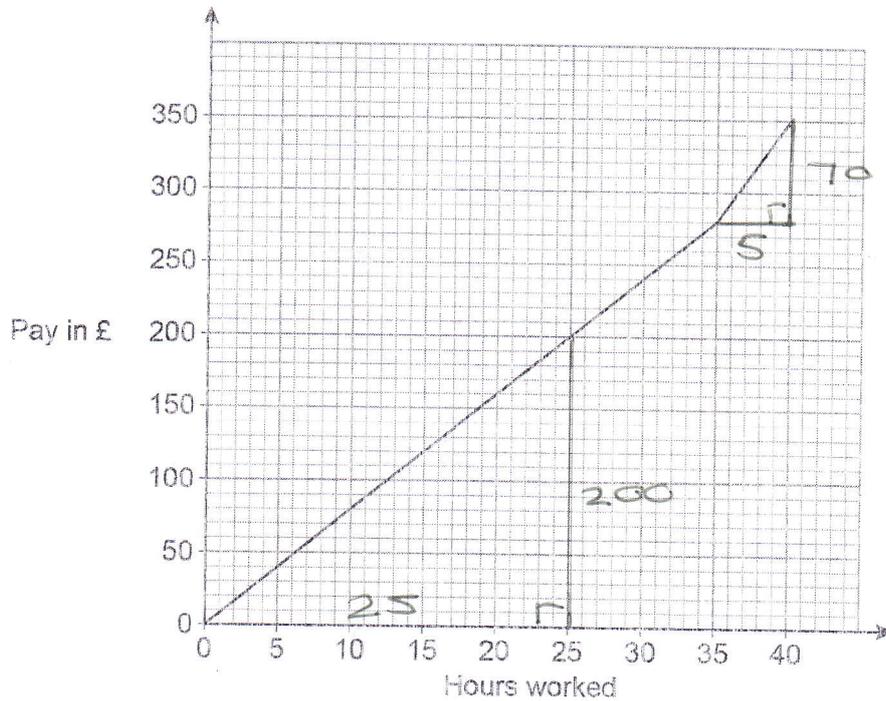


29

The graph shows how much Molly is paid for working for up to 40 hours.

She receives

- a basic rate of pay for the first 25 hours worked
- a higher rate of pay for the next 5 hours worked.



Work out the difference between the higher rate of pay and the basic rate of pay.
Give your answer in £ per hour.

[3 marks]

$$\text{Basic rate} = \frac{200}{25} = \text{£}8 \text{ per hour}$$

$$\text{Higher rate} = \frac{70}{5} = \text{£}14 \text{ per hour}$$

$$14 - 8 = 6$$

Answer £ 6 per hour



30

Work out

$$\sqrt[3]{512} = 8$$

cube root of 512 : reciprocal of 0.4

$$\frac{1}{0.4} = 2.5$$

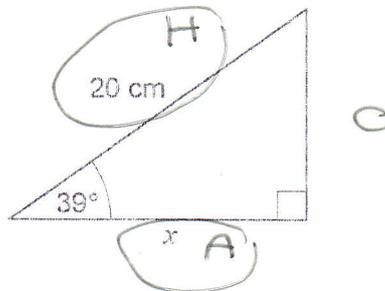
Give your answer in the form $n:1$

[3 marks]

$$\div 2.5 \quad \left(\begin{array}{l} 8 : 2.5 \\ 3.2 : 1 \end{array} \right) \div 2.5$$

Answer 3.2 : 1

31

Use trigonometry to work out the value of x .SOH CAH TOANot drawn
accurately

[2 marks]

$$\begin{aligned} \cos(39) \times 20 \\ = 15.54291923 \end{aligned}$$

Answer 15.5 cm
(3 sf)

END OF QUESTIONS

